



Coupling water isotope firn diffusion to a fork of the Community Firn Model

Vasileios Gkinis (1), Christian Holme (1), Bo Vinther (1), Emma Kahle (2), and Eric Steig (2)

(1) University of Copenhagen, Niels Bohr Institute, Copenhagen, Denmark (v.gkinis@nbi.ku.dk), (2) Earth & Space Sciences, and Quaternary Research Center, University of Washington, Seattle, USA

Firn isotope diffusion is a process that occurs in the porous medium of the firn from the time of deposition until the close-off depth. It attenuates the isotopic signal in ice core records thus reducing their temporal resolution. On the other hand its dependence on temperature allows for the use of the process as a paleothermometer. The estimation of the diffusion rates for certain conditions of temperature and accumulation is also dependent on the modelling approach taken with respect to the densification rates of the polar firn.

We present here a fork of the Community Firn Model to which we have coupled a water isotope firn diffusion module following the description of diffusion in Gkinis et al. and using the diffusivity parameterisation of Johnsen et al. Steady state as well as transient tests are presented using 4 different densification models. We also look into the effect of the seasonality on the calculation of the diffusive rates. Lastly, we invert the model in order to assess the performance of each densification model with respect to paleotemperature estimation.